

• ***SPRAY*** •

**PROJECT**

**CALGARY POWER LTD.**

**ALBERTA, CANADA**

## **POWER PLANTS — Data**

The three power plants of the development have a combined output of 88,600 h.p. Each is picturesquely located in rugged setting typical of the mountain country south of Canmore and Banff.

The Three Sisters control plant operates under a maximum head of sixty feet and contains a 3,600 h.p. propeller-type turbine unit with a 4,000 k.v.a. generator. Its output will diminish as the level of the lake drops as storage is used.

The main equipment of the Spray plant consists of a 62,000 h.p. Francis-type turbine operating at 450 r.p.m. under a head of 905 feet. This is directly connected to a vertical generator of 47,500 k.w. capacity. In order to handle this large equipment a 145-ton crane is installed in this plant.

Rundle plant, of similar output capacity to Cascade plant near Banff, operates under a head of 325 feet, its 23,000 h.p. Francis-type turbine turning a 20,000 k.v.a. generator at 300 r.p.m. This plant has a 70-ton crane.

All these plants, each with a single generating unit, will be completely automatic and operated by remote control from a central control room at Seebe (Kananaskis plant).

## **SOUND INVESTMENT**

The Spray project — a part of the Calgary Power current \$30,000,000 expansion program — when completed will cost more than \$12,000,000. It will be built at no cost to the taxpayers. Fair return on the investment will be realized through the production of much-needed power at reasonable rates for Alberta's ever-growing industrial, agricultural and commercial economy.

## **FUTURE DEVELOPMENT**

Big as it is, the Spray development is acknowledged to be incapable of accommodating Alberta's record-breaking needs for power for any great length of time. However, Calgary Power Ltd., plans not just for today, but for the future as well — and plans are already underway to develop further hydro sites within the Province.



# The SPRAY DEVELOPMENT

**C**RADLED in the Canadian Rockies, high above the Town of Banff, the Spray drainage basin has become a large man-made reservoir to conserve precious power-full mountain water. Nature's fortunate arrangement of the local topography prompted Calgary Power engineers to conceive on paper the twenty-mile-long storage area which has now become an accomplishment in fact.

## LOCATION

The Spray River, one of the main tributaries of the Bow, rises in the area south and beyond the Three Sisters and is fed by the snows and glaciers along the Continental Divide between Mt. Assiniboine and the Palliser Pass. It flows northward to meet the waters from Upper and Lower Spray Lakes, which are immediately south of the familiar Three Sisters Mountain, thence northwesterly through the Spray Canyon and Spray Valley until it finally joins the Bow River at Banff.



## SCHEME OF DEVELOPMENT

Once the project is complete the water will pass through six hydro plants, producing power for Alberta's domestic, farm, commercial and industrial consumers.

The scheme of the development was to divert the water of Spray River from its natural course at Spray Canyon and lead it, while maintaining its elevation, to a point above the Bow River where the vertical drop could be concentrated in a short horizontal distance. Water dropping through that height could produce large quantities of electrical power.

This was done by damming the Spray Canyon, diverting the water through Spray Lakes Valley into Goat Creek Valley which runs parallel to the Bow River Valley, and finally bringing it out over Whiteman's Pass to rejoin the Bow River at Cammore.

## WIDESPREAD BENEFITS

Significant benefits for the Nation, Western Canada and the Province of Alberta will result from the construction of the Spray Power Development.

It will play an important role in the future Industrial, Commercial and Agricultural development of Alberta. Power produced at Spray will help provide a powerful stimulus to the development of a broader economic base for the Province through the attracting of much-needed manufacturing, processing, and basic industries.

New industrial plants attracted to the Province by an assured low-cost power supply will provide many new job opportunities for Albertans and will help create an integrated industrial and agricultural expansion. The increased population to be expected will provide an enlarged market for local farm produce.

The additional power created in the present and future down-stream plants on the Bow River, through release of Spray Lakes storage water, will benefit all the people of Alberta, including those not served directly by Calgary Power's system.

## **FLOOD CONTROL**

By storing water during the spring high run-off period in the Spray Lakes storage basin, the possibility of a flood along the Bow River Valley will be appreciably reduced.

## **HISTORY**

As early as 1911 the storage possibilities by diversion of Spray River into the large valley of the Spray Lakes were investigated by early reconnaissance engineers.

Calgary Power first became interested in Spray in 1921, and in subsequent years the great power potentialities were recognized because of the proximity of Upper Spray Lake to the Bow Valley and the fact that it was 1,120 feet above it.

Investigations carried on through the years were climaxed by intensive surveys of 1947 and 1948 which led to the application for license and governmental approval in 1948.

## **STRUCTURES**

**Roads**—Before any actual work on the project could be done a system of access roads, climbing up from Canmore along the side of Mt. Rundle over Whiteman's Pass and through Goat and Spray Lakes Valleys, had to be built. This road work started September 27, 1948, and first construction equipment reached the main damsite December 17, 1948—signalling the actual beginning of construction on the project.

**Main Dam**—Near the south end of the project, the main dam blocks the flow of Spray River down the Spray Canyon, its earth-fill bulk rising 193 feet from the lowest level of bed rock to the crest. Of 640 feet length at the crest and 1,030 feet thickness at the base, it contains 1,117,000 cubic yards of material. Every yard of this material was excavated, hauled and placed in the dam between May

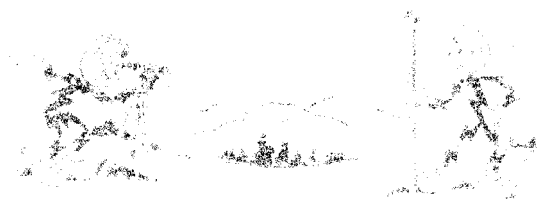
20 and November 20, 1949 — a remarkable feat. In a record 24-hour period, 13,000 cubic yards of material were placed.

**Storage Reservoir** — The main dam, by raising the water 165 feet, created a reservoir in the Spray Lakes Valley which covers 4,800 acres of land. All except 400 acres, which were contained in Upper and Lower Spray Lakes, had to be cleared of timber and brush before flooding could take place. This clearing represented a major part of the project.

The Spray storage reservoir has a capacity of 190,000 acre-feet of active storage, which water will not only be used in the Spray plants, but will be used to supplement winter flows at existing and future plants on the Bow River below Canmore.

**Three Sisters** — In order to contain the water in the reservoir, a dam was constructed in Goat Valley immediately behind the Three Sisters Mountain. This Three Sisters dam is 1,980 feet long and 48 feet high. Below the dam is located the Three Sisters power plant which will control the flow of water from Spray reservoir.

**Canal System** — The water from Three Sisters plant is carried by a system of level canals and dykes down Goat Valley and through Whiteman's Pass to the intake of the pressure tunnel high on the slopes of Chinaman's Peak above Canmore.



**Pressure Tunnel** — This tunnel, nearly 2,200 feet long, drops the water 905 feet from the crest of Whiteman's Pass to the Spray power plant at the foot of Chinaman's Peak. The top 1,236 feet of this tunnel is on a 45° slope with the lower 915 feet leading horizontally to the power plant. The excavated diameter of the tunnel was made 10 feet 6 inches. It has been finished to seven feet six inch diameter by concreting at the upper end and steel lined over the lower end for 500 feet.

**Spray** — Nestled in a niche blasted in the hard rock wall at the base of Chinaman's Peak, Spray plant is solidly placed to withstand the force of water dropping over 900 feet to its turbine. It is the main power plant of the Spray development, producing 62,000 h.p.—more than any other single plant in the Calgary Power system.

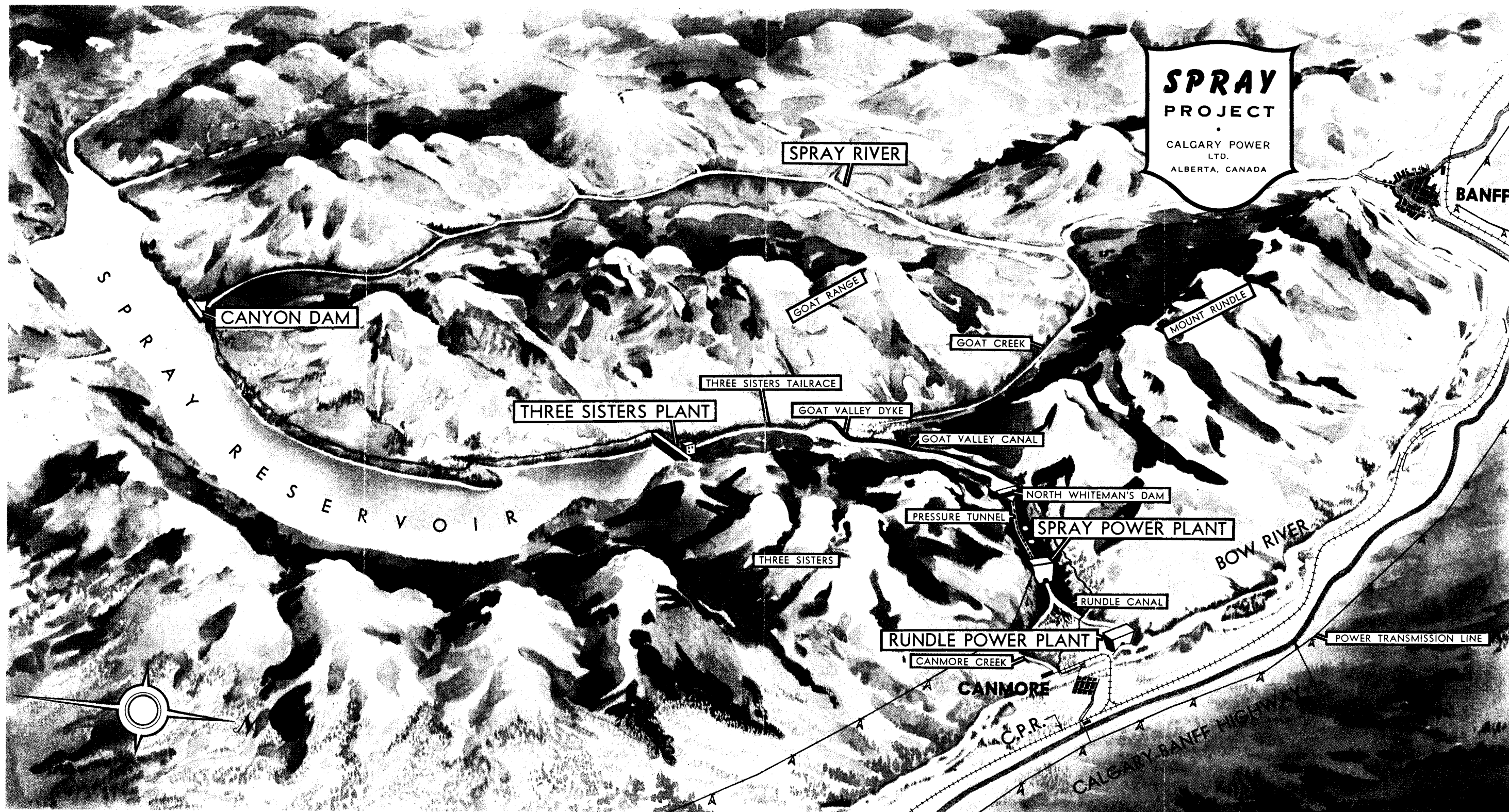
**Rundle** — The water from Spray plant is carried by a canal to a point close to the Bow River west of Canmore where it takes its final plunge of 325 feet through a steel penstock to the Rundle plant; finally discharging into the Bow River.



Main, or Canyon Dam is a plug of over one million cubic yards of earth fill blocking the upper end of Spray Canyon. Spray River water is thus backed up in the Spray Lakes Valley which has become a large reservoir to feed three new power plants. Water stored behind this dam has been made to flow in reverse direction to Three Sisters, Spray and Rundle plants, dropping into the Bow at Canmore instead of at Banff.



Three Sisters plant takes advantage of control works installed at the North end of Spray reservoir to develop power from a small head at Three Sisters Dam. The 3,600 electrical horsepower installation at this plant is able to produce power in proportion to the level of reservoir water behind the dam.





This plant, fed through a 2,151-foot hard-rock tunnel which drops the water a vertical distance of 905 feet, produces 62,000 electrical horsepower.

The single Francis-type turbine unit, shaft-coupled to the generator, rotates at 50 r.p.m.

Spray plant makes use of water from the Spray drainage system which has been diverted from its round-about course to Banff. Water stored in Spray Lakes Valley, is conducted by an ingenious canal system through Whiteman's Pass above the plant, concentrating the sizeable head in a short horizontal distance.





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